

WHAT IS CLAIMED IS:

*Substantially*

1. A water jet cutting apparatus for cutting a web in a papermaking machine, the apparatus comprising:
  - a beam extending transversely across the width of the web;
  - a first carriage mounted to the beam and movable along the beam;
  - a water jet cutting apparatus mounted to the first carriage and having a nozzle positioned for cutting into the web as the first carriage moves along the beam;
  - a flexible water supply conduit connected to said cutting apparatus to supply pressurized water to the water jet nozzle;
  - first drive means for driving the carriage along the beam;
  - a second carriage mounted to the beam and moveable along the beam;
  - a wheel rotatably mounted on the second carriage for movement therewith along the beam, the wheel adapted to have the water supply conduit guided and stretched thereabout, the wheel supporting the water conduit as the second carriage moves along the beam; and,
  - second drive means for driving the second carriage along the beam, the second drive means being interdependent with the first drive means to move the second carriage along the beam at speeds that are relative to the speeds at which the first drive means moves the first carriage along the beam.
2. The water jet cutting apparatus of claim 1 wherein the first drive means moves the first carriage across the width of the beam at twice the speeds at which the second drive means moves the second carriage along the beam.

3. The water jet cutting apparatus of claim 1 wherein the beam includes a first track along which both the first and second carriages move.

*Sub a 2/7* 4. The water jet cutting apparatus of claim 1 wherein: the first drive means includes a first movable belt extending around the beam, the first carriage being attached to the first movable belt;

a pair of first drive transmission pulleys mounted at the ends of the beam around which the first movable belt is driven;

10 the second drive means includes a second movable belt extending around the beam adjacent the first movable belt, the second carriage being attached to the second movable belt;

15 a pair of second drive transmission pulleys mounted at the ends of the beam around which the second movable belt is driven, and the second drive pulleys each having a circumference that is  $\frac{1}{2}$  the circumference of each of the first drive pulleys; and,

a drive motor mounted to at least one of the ends of the beam to drive a corresponding one of the first and second pulleys.

20 5. The water jet cutting apparatus of claim 4 wherein each of the first and second pulleys are toothed sprockets located at each end of the beam and are driven by a single drive shaft, and the first and second movable belts are timing belts

25 6. The water jet cutting apparatus of claim 4 wherein each of the first and second pulleys are toothed sprockets located at each end of the beam and are driven by a single drive shaft, and the first and second movable belts are chain belts.

*Sub a 3/7* 7. The water jet cutting apparatus of claim 5 wherein the first

and second sprockets located at each end of the beam are initially rotatable relative to each other for initial adjustments and are locked in place relative to each other during operation.

8. The water jet cutting apparatus of claim 1 wherein the water supply conduit has a first end connected to said cutting apparatus and has a second end connected to a water supply fitting located adjacent an end of the beam, the water supply fitting having a spring clamp to compensate for hose shrinkage while maintaining a nominal tension on the hose.

9. The water jet cutting apparatus of claim 1 wherein the beam has a wall adjacent the web that has apertures through which a negative pressure is drawn to pull the web against the wall of the beam.

10. A water jet cutting apparatus for cutting a turn-up tip in a web of a papermaking machine, the apparatus comprising:  
a beam extending transversely across the width of the web;  
first and second carriage sets mounted on opposing sides of the beam for movement along the beam in opposite transverse directions;  
each of the first and second carriage sets having a faster moving carriage and a slower moving carriage;

20 a water jet cutting apparatus mounted to the faster moving carriage of each of the first and second carriage sets, the water jet cutting apparatus each having a water jet nozzle positioned for cutting into the web as the respective faster moving carriage moves along the beam;

flexible water supply conduits connected to the cutting apparatus to supply pressurized water to corresponding ones of the water jet nozzles;

25 hose carrying wheels mounted for rotation to each of the slower moving carriages for movement therewith along the beam, each of the

hose wheels having one of the water supply conduits guided and stretched, each of the hose wheels supporting the one water conduit as its slower moving carriage moves along the beam;

5 first drive means for driving the faster moving carriages along the beam in opposing transverse directions to each other; and,

10 second drive means for driving the slower moving carriages along the beam in opposing transverse directions to each other, the second drive means being interdependent with the first drive means to move the slower moving carriages along the beam at speeds that are relative to the speeds at which the first drive means moves the faster moving carriage along the beam.

15 11. The water jet cutting apparatus of claim 10 wherein the first drive means moves the faster moving carriage across the width of the beam at twice the speeds that the second drive means moves the slower moving carriage across the beam.

11 12. The water jet cutting apparatus of claim 10 wherein the beam includes a track on both sides of the beam along which respective sides the first and second carriage sets move.

20 *5/6 117* 13. The water jet cutting apparatus of claim 10 wherein: the first drive means includes a first movable belt extending around the beam, the faster moving carriage being attached to the first movable belt;

a pair of first transmission pulleys mounted at the ends of the beam around which the first movable belt is driven;

25 the second drive means includes a second movable belt extending around the beam adjacent the first movable belt, the slower moving

carriage being attached to the second movable belt;

a pair of second transmission pulleys mounted at the ends of the beam around which the second movable belt is driven, and the second drive pulleys each having a circumference that is  $\frac{1}{2}$  the circumference of each of the first drive pulleys; and,

a drive motor mounted to at least one of the ends of the beam to drive a corresponding one of the first and second pulleys.

*Subs 5* 14. The water jet cutting apparatus of claim 13 wherein each of the first and second pulleys are toothed sprockets located at each end of the beam are driven by a single drive shaft, and the first and second movable belts are timing belts.

15. The water jet cutting apparatus of claim 13 wherein each of the first and second pulleys are toothed sprockets located at each end of the beam are driven by a single drive shaft, and the first and second movable belts are chain belts.

*Subs 6* 16. The water jet cutting apparatus of claim 14 wherein the first and second sprockets located at each end of the beam which are initially rotatable relative to each other for initial adjustments and are locked in place relative to each other during operation.

20 17. The water jet cutting apparatus of claim 10 wherein the water supply conduit has a first end connected to said cutting apparatus and has a second end connected to a water supply fitting located adjacent an end of the beam, the water supply fitting having a spring clamp to compensate for hose shrinkage while maintaining a nominal tension on the hose.

25 *16* 18. The water jet cutting apparatus of claim 10 wherein the beam has a wall adjacent the web that has apertures through which a negative

pressure is drawn to pull the web against the wall of the beam.

19. <sup>17</sup> The water jet cutting apparatus of claim <sup>10</sup> wherein a water jet catch tray is located at opposing sides and ends of the beam for preventing the water jet from contacting the web as the water jet moves with its respective faster moving carriage along the beam over the catch tray.

20. <sup>18</sup> The water jet cutting apparatus of claim <sup>10</sup> wherein the hose wheel is a grooved wheel.

10 Sub a 17 21. A web cutting apparatus for cutting a web in a papermaking machine, the apparatus comprising:

at least one beam extending transversely across the width of the web;

a first carriage mounted to the beam and movable along the beam;

15 a cutting apparatus mounted to the first carriage for cutting into the web as the first carriage moves along the beam;

a flexible conduit connected to said cutting apparatus to supply the cutting apparatus with a cutting medium;

first drive means for driving the carriage along the beam;

20 a second carriage mounted to the beam and moveable along the beam;

. a wheel rotatably mounted on the second carriage for movement therewith along the beam, the wheel adapted to have the supply conduit guided and stretched thereabout, the wheel supporting the conduit as the second carriage moves along the beam; and,

25 second drive means for driving the second carriage along the beam, the second drive means being interdependent with the first drive means to

move the second carriage along the beam at speeds relative to the speeds at which the first drive means moves the first carriage along the beam.

22. The web cutting apparatus of claim 21 wherein the first drive means moves the first carriage across the width of the beam at twice the speed at which the second drive means moves the second carriage along the beam. <sup>21</sup>

23. The web cutting apparatus of claim <sup>21</sup> <sup>19</sup> wherein the beam includes a first track along which both the first and second carriages move.

24. The web cutting apparatus of claim 21 wherein:  
at least one beam is a single beam construction;  
the first drive means includes a first movable belt extending around the beam, the first carriage being attached to the first movable belt;

15 a pair of first drive transmission pulleys mounted at the ends of the beam around which the first movable belt is driven;

the second drive means includes a second movable belt extending around the beam adjacent the first movable belt, the second carriage being attached to the second movable belt;

20 a pair of second drive transmission pulleys mounted at the ends of the beam around which the second movable belt is driven, and the second drive pulleys each having a circumference that is  $\frac{1}{2}$  the circumference of each of the first drive pulleys; and,

a drive motor mounted to at least one of the ends of the beam to drive a corresponding one of the first and second pulleys.

25. The web cutting apparatus of claim 24 wherein each of the first and second pulleys are toothed sprockets located at each end of the

beam and are driven by a single drive shaft, and the first and second movable belts are timing belts

26. The web cutting apparatus of claim 24 wherein each of the first and second pulleys are toothed sprockets located at each end of the beam and are driven by a single drive shaft, and the first and second movable belts are chain belts.

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S 10 a 97 27. The web cutting apparatus of claim 25 wherein the first and second sprockets located at each end of the beam are initially rotatable relative to each other for initial adjustments and are locked in place relative to each other during operation.

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15 28. The web cutting apparatus of claim 21 wherein the supply conduit has a first end connected to said cutting apparatus and has a second end connected to a supply fitting located adjacent an end of the beam, the supply fitting having a spring clamp to compensate for hose shrinkage while maintaining a nominal tension on the hose.

29. <sup>30</sup> The web cutting apparatus of claim 21 wherein the beam has a wall adjacent the web that has apertures through which a negative pressure is drawn to pull the web against the wall of the beam.

20 S 10 a 10 + 30. The web cutting apparatus of claim 21 wherein the supply conduit is looped around the wheel by 180 degrees.

31. The web jet cutting apparatus of claim 10 wherein the supply conduit is looped around the wheel by 180 degrees.

32. The web jet cutting apparatus of claim 1 wherein the supply conduit is looped around the wheel by 180 degrees.